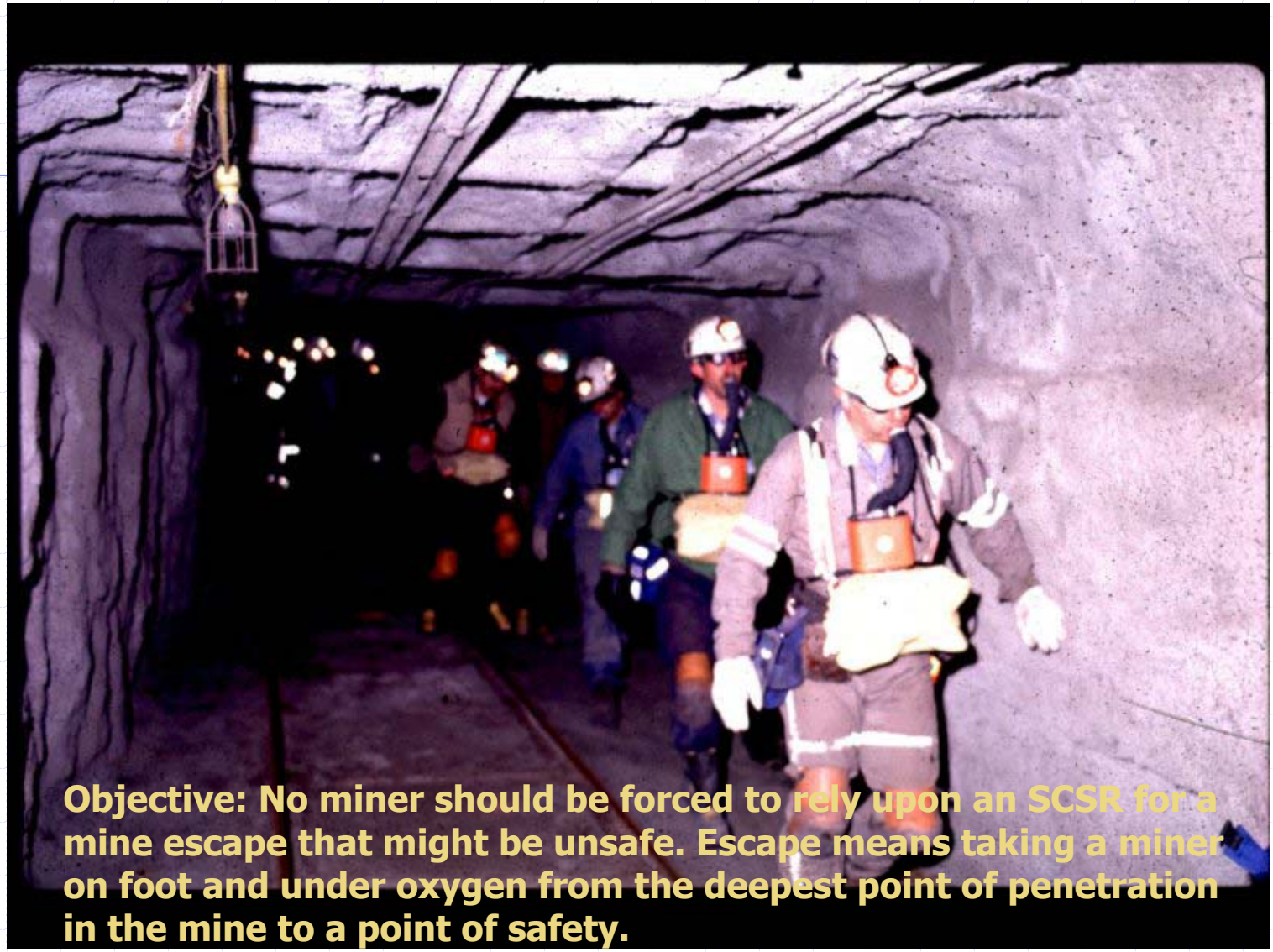
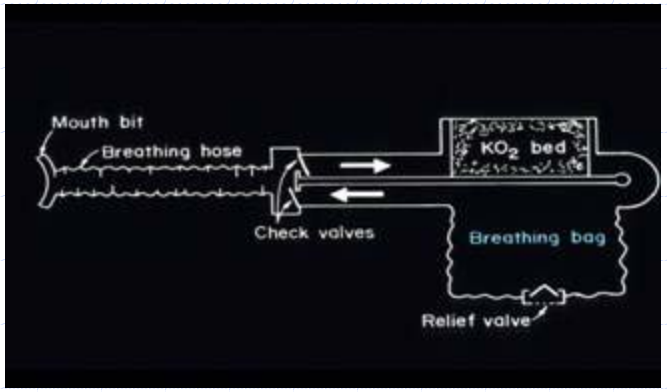
New Concepts

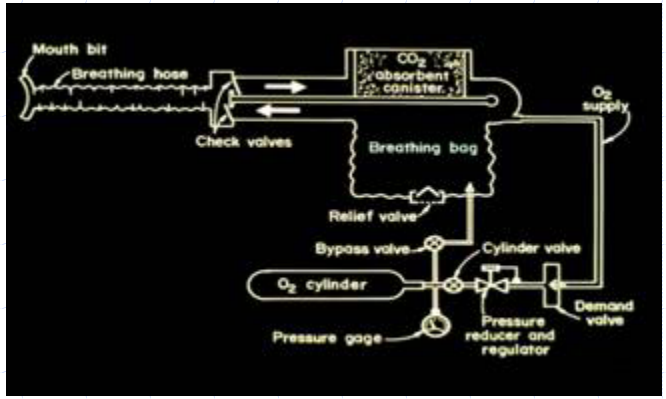
Marriott Key Bridge, Arlington, VA

April 10, 2003

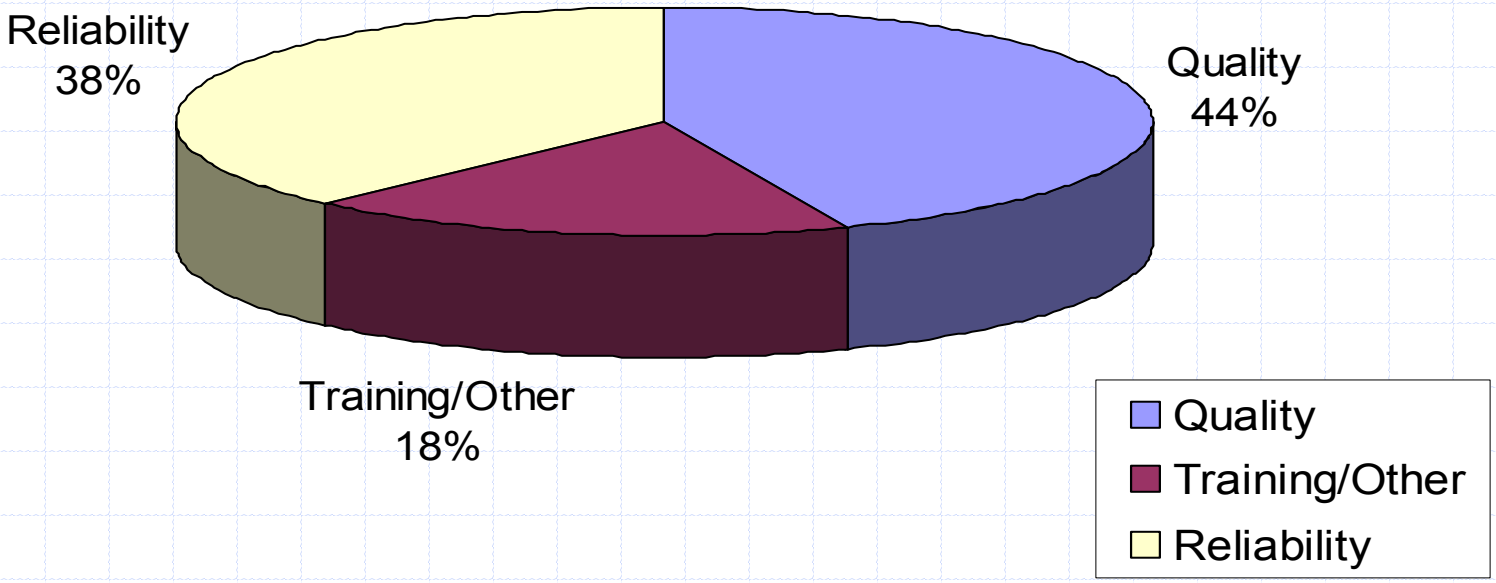

Objective: No miner should be forced to rely upon an SCSR for a mine escape that might be unsafe. Escape means taking a miner on foot and under oxygen from the deepest point of penetration in the mine to a point of safety.

Approved SCSRs and Schematics





Source of problems investigated since 1992



Current Service Life Plans define the *ultimate* duration of deployment.

- Existing plans do not assure that every unit would remain in service for the entire duration, nor were they ever meant to.
- Ideally, units that are over-exposed to damaging conditions would reveal themselves and be removed from service.
- Primary culprits are shock, vibration, and heat.

Chemical Migration - Breathing Hose Deterioration

Goals/Objectives

- Provide safe apparatus
- Focus - consistent behavior of devices
- Standard must avoid ambiguities
- Develop standard predicated on certification – not by use/deployment
- Avoid test subject controlling outcome
- Shared responsibility
- Make the units easier to inspect
- Pass/fail indicators for temperature and mechanical shock

Philosophy

We want to be able to approve the simplest of designs that meet appropriate performance requirements.Simplicity in design leads to ease and confidence in use and greater reliability.

Shared Responsibility							
Simple Design			Discovery and Response				
Pre-Deployment			Deployment				
Approval		Manufacturing	Training		Audits: Early Detection		Effective Reaction
Ruggedness/ Hazard Testing	BMS Testing	QC Module	Training: Proper Handling	Training: Effective Use	Self-Reporting/ NDT	LTFE	Registration

Proposed Actions

- BMS Testing
- Ruggedness and Reliability Regulations
- Safety Requirements
- Eye Protection
- Audits
- Registration

Breathing and Metabolic Simulator (BMS) - Reasons

- Provide a uniform basis for evaluating the functional characteristics of SCSRs at any stage of deployment
- Establish performance characteristics that are statistically sound
- Increase the scientific confidence of judgments made
- Can continuously monitor performance
- Can determine the performance to depletion of breathable gas supply
- Retain human subject testing as an approval criteria

BMS Testing

- Programmed BMS to be a replica of MT#4 for the 95% miner
- Test at fixed work rate for 95% miner
- Programmed to duplicate only what humans can actually accomplish

Human Subject Testing

- Calibrated subject
- Constant work rate
- Reacts to changes in SCSR performance
- BMS tests will be a surrogate for human subject testing.

Ruggedness and Reliability Requirements - Reasons

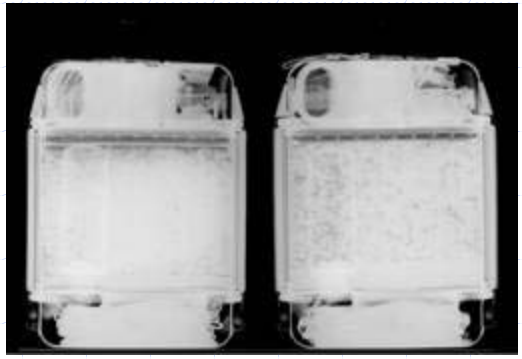
- Establish baseline ruggedness
  - Shock
  - Vibration
  - Temperature
- Objective - self-report on readiness
  - Visual inspection
  - Non-destructive testing
  - Temperature indicators
  - Trauma indictors
  - Wear indicators
  - Tamper resistant packaging

Non-Destructive Testing

Laboratory ND Noise Test

In-Mine ND Noise Test

Draeger AMS



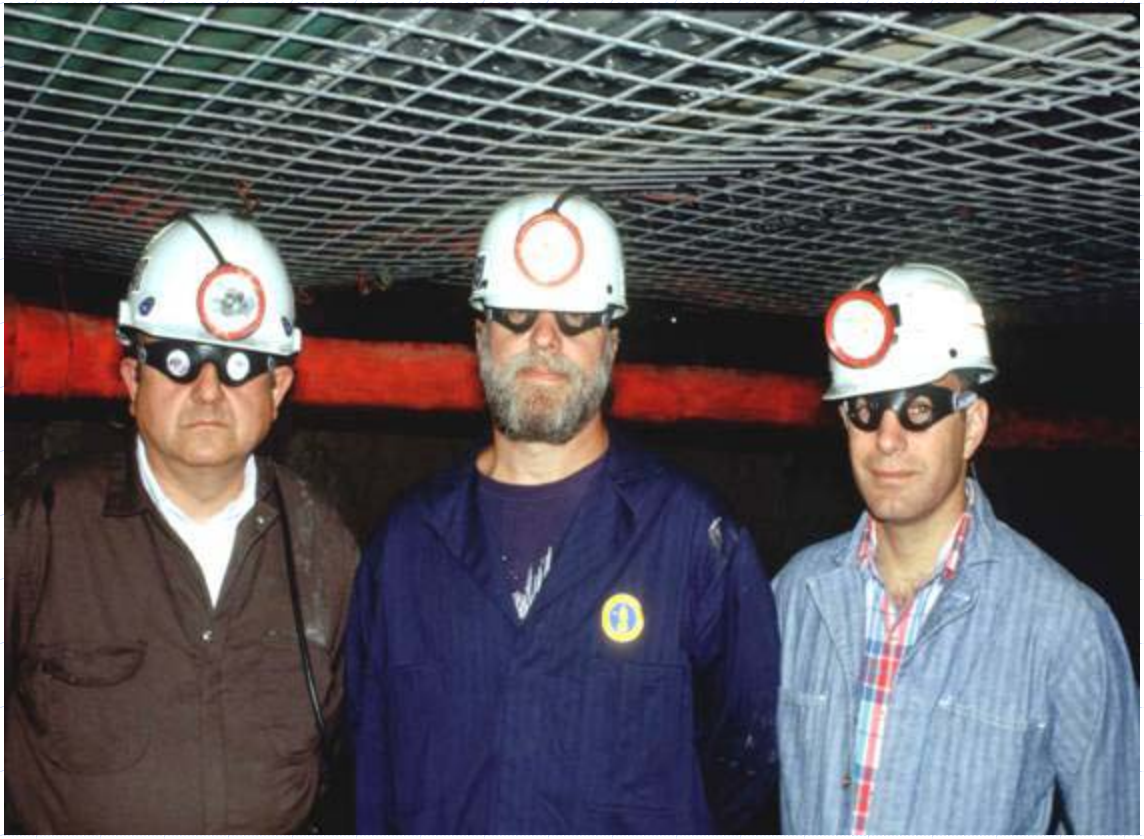
Neutron Radiography

Safety Requirements - Reasons

- Prevent new risks
  - Fire hazards
  - Explosion hazards

Eye Protection - Reasons

- Anti-fog
- Gas
- Vapor
- Smoke



Audits - Reasons

Need adequate post deployment auditing to assure that the standard delivers the desired level of performance over the deployed life.

Registration - Reasons

- Tracking
- Determine market
- Improve auditing
- Determine potential extent of problems

Questions?

Discussion